ASPECTS OF THE BIOLOGY OF THE CHESTNUT-SIDED SHRIKE-VIREO

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The Chestnut-sided Shrike-vireo (*Vireolanius melitophrys*) occurs above 1850 m in upper tropical and subtropical zones from the Mexican states of Jalisco, San Luis Potosi, and Vera Cruz (Blake 1968) south to the volcanic highlands of western Guatemala (Land 1970). Little is known of this species in the field and only a few reports concerning aspects of its general biology have been published (Davis 1962, Schaldach 1963, and Rowley 1966).

The Chestnut-sided, with the Emerald (*Vl. pulchellus*) (*Vl.* will be used hereafter to indicate *Vireolanius*) and Slaty-capped (*Vl. leucotis*) shrike-vireos, both of humid lowland tropical forests, comprise the subfamily Vireolaniinae, and with peppershrikes (Cyclarhinae) and vireos (Vireoninae) constitute the family Vireonidae (Blake 1968). Our study describes the first known nests, vocalizations, and aspects of the breeding behavior and ecology of the Chestnut-sided Shrike-vireo and compares these with similar data for other vireonids.

MATERIALS AND METHODS

Plumage characters and size.—The boldly patterned Chestnut-sided, the shimmering green Emerald, and the bright yellow and green Slaty-capped shrike-vireos contrast sharply with other vireonids which are mainly species of plain or subdued plumage. *Vireolanius melitophrys* and the Black-capped Vireo (*Vireo atricapillus*) are the only vireos that demonstrate sufficient dimorphism in adult plumage characters to allow ready identification of the sexes in the field. In this shrike-vireo females are paler than males, especially ventrally, and have a narrower bar of chestnut across the breast and smaller areas of this shade on the sides of the breast and flanks than do males.

No sex-related differences in size are apparent in the Chestnut-sided Shrike-vireo. Adults are about 17.5 cm in total length, and weigh about 33 g. Among vireonids only the Cozumel Island race of the Rufous-browed Peppershrike (*Cyclarhis gujanensis insularis*) equals the Chestnut-sided Shrike-vireo in size.

Study area and habitat.—Beginning in November 1971 fieldwork was undertaken at 2 locations, 10 km apart, at about 2880 m in the mountains of northern Morelos in mixed coniferous-deciduous forest where the Chestnut-sided Shrike-vireo was known to occur. The sites resembled each other in composition of vegetation but differed in the degree of exploitation by local people. About 3 km W of the village of Huitzilac the forest covering the southeastern slopes of the higher peaks was essentially continuous although cutting trees for charcoal was widespread. In contrast, at the second locality 5 km S of Tres Cumbres along route 95 to Cuernavaca, some large trees and most of the undergrowth had been cleared for farming, or by woodcutters,

FIG. 1. Disturbed pine-oak forest S of Tres Cumbres, Morelos (2880 m), in a Chestnut-sided Shrike-vireo territory.

resulting in a mosaic of small fields and patches of forest (Fig. 1). We worked in both localities for parts of 3 days in November 1971 and 6 days in November 1972 and 16 days each in May 1972 and 1973.

Where relatively undisturbed, the mixed forest of the study areas comprised as well as pines (*Pinus* sp.), a variety of broad-leaf deciduous trees, which averaged about 12 m in height; a few large oaks (*Quercus* sp.) reached 20 m. The oaks, festooned with a variety of epiphytes, grew mostly along drainages and in narrow ravines coursing down the mountain slopes. Many of the pines were more than 30 m tall. Underbrush consisted of fairly dense leafy shrubs and tangles of vines. In vegetation, our study areas were consistent with descriptions from other parts of the range of the Chestnut-sided Shrike-vireo of pine-oak habitat, ranging from open scrub (Davis 1962) to tall, dense, humid or cloud forest with fairly complex canopy (Schaldach 1963, Rowley 1966). In May heavy rainfall could be expected daily in the area. In November tree-level cloud cover occurred occasionally but rain was sporadic.

Field and laboratory procedures.—Activities at the nests were observed with binoculars from concealment so as to minimize disturbance. We followed pairs or individuals in the study sites. Distances among farthest song perches were used for rough approximations of territory size. We studied foraging behavior of shrike-vireos by noting type of prey and the position and kind of sites from which food was taken.

Vocalizations of 6 males and 2 female Chestnut-sided Shrike-vireos were taped in May of 1972 and 1973 with a Uher 4000 Report-L tape recorder using an M537 Uher microphone mounted in a 44.5 cm Gibson sound parabola. Sound spectrograms were produced with a 6061B Kay Electric Sona-Graph using the wide band setting.

RESULTS AND DISCUSSION

Status.—Previous authors have not considered Chestnut-sided Shrike-vireos to be common (Miller et al. 1957, Edwards 1972). However, we found this species to be locally common in our study areas. In the first visit to the 2 sites in November 1971 the only shrike-vireo encountered was a female south of Tres Cumbres. At that time we knew nothing of the vocalizations of the species and thus were relying solely on sightings. On 6 May 1972 near Huitzilac, vocalizations of both members of a pair were recorded. In the next few days within 1 km of the place where the first pair was encountered we saw 10 additional birds and heard as many as 15 calling. In November of 1972 we observed at least 5 males and 1 female in the 2 circumscribed study sites. In May 1973 we did not search extensively for birds near Huitzilac but rather concentrated on a pair whose nesting habits we studied. In the same year, near Tres Cumbres we found 3 pairs in an area about 600 m in diameter.

Vocalizations.—Males sang at irregular intervals throughout the day in May but only occasionally and for short periods in November. In the breeding season the highest sustained rate of song was noted in conjunction with the early stages of nest-building. For example on 12 May 1973 the male associated with one of the nests sang 15 to 30 songs in bouts approximately 1 min in length at 10 min intervals from 09:00 until 11:30. As in most oscines, song largely ceased in early afternoon and was followed late in the day by a second short period of accelerated singing. Many kinds of vireos tend to sing more than other passerines in the same habitat (Barlow 1962). The Chestnut-sided Shrike-vireo, however, seems less vociferous than any of the other 35 vireonid taxa with whose singing patterns we are familiar.

Singing postures.—In the most frequently observed singing posture the body of the male shrike-vireo was maintained at an angle of about 50° from the horizontal. Occasionally in times of agitation the body angle approached 80°. The bill was held at right angles to the body and the head was not visibly bobbed or otherwise moved. The wings and tail were not moved appreciably. Song in flight was only noted when combatant males sang the primary song while flying short distances and in supplanting attacks.

Types of vocalizations.—Six vocalizations were readily distinguishable in the field which were later confirmed with spectrographic analysis. The sounds are divisible into songs and calls.

(1) Primary song (Fig. 2A). The monosyllabic primary song, given only by the male, begins as a short, ascending, whining moan which becomes a descending, wailing whistle terminating abruptly. The song may

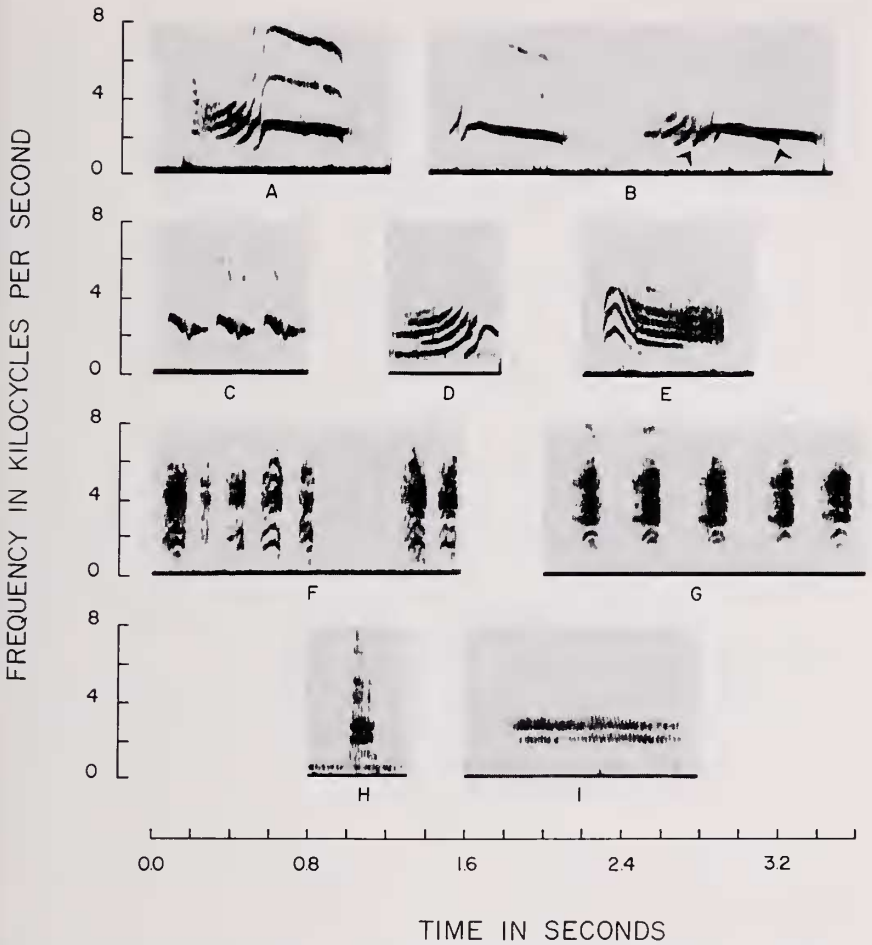

FIG. 2. Shrike-vireo vocalizations. A. Primary Song; B. Fight ♂♂ *Vl. melitophrys*; C. Primary Song of *Vl. pulchellus*; D. Short Song; E. *Myaaaah* Call; F. Distress Call; G. Distress Call; H. Contact Call; I. Buzz-rattle.

be given singly or repetitively and the interval between successive songs ranges from 0.4 sec, in a male responding either to playback of taped song or to an intruding male, to 1.2 sec in an unstressed male simply singing from some perch within his territory. There is probably a little individual variation in song length among males as 10 songs each of 3 different males averaged in length 0.74 sec, 0.72 sec, and 0.93 sec respectively.

In the short ascending part of the song, energy is concentrated in the first 3 of 4 harmonics whereas energy in the whistled portion is concen-

trated in the fundamental. In some tracings second and third harmonics are seen at about 2 KHz intervals above the fundamental, but these may be electronically enhanced artifacts. Pitch of songs of the above 3 birds averages between a low of 1.25 KHz and a high of 4.08 KHz (range 1 to 4.5 KHz).

In this species song appears to function in sex and species recognition and to stimulate the female in nest-building and courtship. In the latter context, the male accompanies the female with song as they gather nesting material or forage and as they approach the nest. Primary song was clearly audible at distances of 400 m. Since the song does not attenuate rapidly we suggest that it provides special locative advantages should the sexes become widely separated in an environment where prevalent foggy conditions, dense vegetation, and mountainous terrain may greatly reduce visibility.

On 5 May near Huitzilac, high intensity primary song was heard as we observed 2 males fighting, chasing, and directing supplanting attacks at each other. Throughout these activities both birds sang rapidly, sometimes almost antiphonally. Since their individual songs varied in the degree of overlap or did not overlap at all (Fig. 2B), high intensity countersinging rather than antiphony was probably involved.

The primary songs of the Chestnut-sided Shrike-vireo and the closely related Emerald Shrike-vireo (Fig. 2C) bear no resemblance to one another other than that they both may involve the repetition of a single sound; however, repetition of the same syllable or song is characteristic of the vocal patterns of many vireonids. The song of the latter species which sounds very much like that of the Tufted Titmouse (*Parus bicolor*) comprises a single syllable uttered 3 times in rapid succession. However, greater disparities in songs are found among species in the genus *Vireo* (e.g. the monosyllabic trill of the Blue Mountain Vireo, *V. osburni*, in contrast to the complex song of the Thick-billed Vireo, *V. crassirostris*) and without quantitative study such differences should not be given undue taxonomic importance.

(2) Short song (Fig. 2D). This non-musical vocalization is structurally derived from the primary song. The descending fundamental is short (0.2 sec in length), terminating as an abrupt "whap". This song, given singly, was uttered by the male at the first nest discovered on 3 occasions when he approached or worked on the nest alone. Since the female twice arrived at the nest shortly after the male sang in this manner, we have assumed that the song served as a signal to her.

(3) *Myaaaah* call (Fig. 2E). Sonagrams show that there are some structural resemblances between this call and the initial part of the pre-

vious song. However, the *myaaaah* sound is widespread among vireos of the subgenus *Vireosylva* as an aggressive and locative call (pers. observ.). The female, paired with the male first encountered on 5 May 1972 near Huitzilac, was the only bird that was heard to give this call. Five of these calls were uttered at 2.7 sec intervals as both she and the male flew rapidly from perch to perch in response to playback of the song of this male. In this context the call apparently had an aggressive function serving to threaten an intruder.

(4) Distress call (Fig. 2F, G). Hand held birds gave typical passerine distress calls (see Stefanski and Falls 1973) comprised of syllables of the same or different length as shown. Intervals between syllables varied as a function of the degree of agitation of a bird. Although louder and more harsh, distress calls of this species resembled those of other vireos with which we are familiar.

(5) Contact call (Fig. 2H). Single low-pitched buzzy calls were uttered by both sexes at the nest as they worked together or alone or as the female departed. This call differs structurally from distress calls.

(6) Buzz-rattle (Fig. 2I). This harsh call structurally resembles contact notes but is appreciably longer. It was uttered by both sexes. When approaching the nest in the absence of the female, the male sometimes sang briefly or gave this call. Several times then the female appeared as the male departed. Similarly, the female uttered the buzz-rattle once when she came into the nest alone. The male appeared within a few seconds. This call may have served as a signal between the sexes indicating to the absent (but presumably nearby) partner the presence of the other adult at the nest.

Territorial behavior.—Territorial behavior, as observed in May 1972 and 1973, did not differ appreciably from that of the 20 species of vireonids with which we are familiar in this context. In the breeding season pairs of Chestnut-sided Shrike-vireos maintain mutually exclusive territories perhaps as large as 4.2 ha. The one territory near Tres Cumbres which we regularly visited in May 1973 was located on a west facing slope of about 35° and encompassed about 4.1 ha of open pine forest, with scattered large oaks, open fields, and brushy ravines. On the east this territory was bounded by a 4-lane limited access highway, which the birds were not seen to cross, and on the north, south, and west by territories of other pairs of shrike-vireos. Old highway 95, which paralleled the 4-lane highway, passed from north to south through the territory, bearing fairly heavy automobile and diesel truck traffic which did not seem to disturb the birds. This pair regularly ranged as far as 300 m from the nest-tree.

Adjacent males demonstrated countersinging and gave agitation calls at the times when mutual boundaries were approached. On 6 May 1972 two vocal males and a third silent bird chased each other. One individual directed supplanting attacks at the second male as both sang loudly. These birds fought intermittently for several minutes at one point clutching at each other's feet and uttering distress calls while beating each other with their wings. The entire encounter lasted 3 min after which one male, still singing, accompanied by the silent bird moved down the slope and the other male, also in full song, flew up the mountainside; both could be heard for another 10 min.

Response to playback of taped song in spring consisted of vigorous singing and low rapid flights from perches in nearby trees, over and around the speaker. Song was not accompanied by wing flicking as seen in Bell's Vireo (*Vireo bellii*) (Barlow 1962); however, one male fanned his tail during playback and erection of crown feathers occurred frequently in this context.

One pair of birds and a single male responded to taped song on both 3 and 6 November 1972, near Huitzilac at the same places on each of these dates. Each male approached the recorder but made only 1 or 2 flights over it before landing in a nearby tree to sing. Therefore we think that the birds may stay in the vicinity of their breeding territories outside of the breeding season. Lowery and Newman (1951) also reported birds in Vera Cruz at the same localities in May and December.

We saw no interactions of consequence between shrike-vireos and any other species of birds in the breeding season. Once near Huitzilac we observed a Warbling Vireo (*Vireo gilvus*) foraging within 3 m of a nest as a female Chestnut-sided Shrike-vireo was building, but neither species seemingly took note of the other. Hutton Vireos (*Vireo huttoni*) sang regularly near both the shrike-vireo nests studied but we never noted shrike-vireos responding to the vireos. Noisy flocks and family groups of Gray-barred Wrens (*Campylorhynchus megalopterus*) moved regularly through shrike-vireo territories without incident. These 2 species often foraged within a meter of one another in the same tree. Twice in late autumn we saw female shrike-vireos associated with foraging flocks of much smaller species including Ruby-crowned Kinglets (*Regulus calendula*), Yellow-eyed Juncos (*Junco phaeonotus*), Mexican Chickadees (*Parus sclateri*), Plumbeous Solitary Vireos (*Vireo solitarius plumbeus*), Cassin's Solitary Vireos (*Vireo s. cassini*), and Brown Creepers (*Certhia familiaris*).

Foraging.—Vireonids forage on arthropods by gleaning from foliage, by hawking from perches, and by stalking on twigs, larger branches, and even the trunks of trees. Thin billed forms such as the Red-eyed Vireo (*Vireo*

olivaceus) mostly glean whereas heavier billed species as the Yellow-throated Vireo (*V. flavifrons*) favor bark of larger branches (James 1968).

The Chestnut-sided Shrike-vireo has a massive bill but surprisingly takes most prey from leaves and less frequently from bark. Pine needles, epiphytes, and filamentous lichen are probed and broad leaves are inspected closely. Inner foliage is favored over outer canopy. A foraging bird searches from a perch then hops or flies to another, a meter or so distant. Occasionally an individual hangs beneath a leaf cluster then flutters to a site 1 or 2 m below. Rarely birds hover at clusters probing or plucking insects from them. One 3 min foraging session on 14 May 1973 comprised 25 individual bouts, 23 involved upright gleaning of foliage from perches; one involved hanging beneath a leaf cluster; and one hovering at a cluster. We observed birds foraging from .6 m to 30 m (mode = 8 m) above the ground.

In the breeding season the male and the female typically foraged from .3 m to 4 m apart and the female was usually the first to leave a tree or shrub. The male would follow within a few seconds. Males often sang while foraging but feeding was interrupted by nest-building, preening, and periods of inactivity. Peaks of foraging occurred in the morning between 06:30 and 08:00 and in the afternoon about 16:30.

Although primarily insectivorous, *Vl. melitophrys* apparently also eats some plant material. Davis (1962) mentioned insect fragments including beetle parts and the head of an ant in 2 stomachs. Schaldach (1963) found small spiders and elytra of beetles of the families Curculionidae and Brentidae in crops which he inspected. Schaldach also thought that in the dry season in Colima, that shrike-vireos were eating seeds and hawthorne (*Crataegus*) "apples". Food items we observed being eaten comprised caterpillars, wasps, grasshoppers, true bugs, beetles, and some plant material. Large caterpillars, perhaps 70 mm in length, were not swallowed directly but were held in the bill and either shaken or beaten against a branch. Large, hard-bodied prey were held in one foot and picked apart with the beak, whereas smaller items were swallowed whole.

Nest-building.—The nidification of *Vl. melitophrys* has not been described. Rowley (1966) predicted that the nest, when found, would be well concealed among epiphytes. This did not prove to be true. On 5 May 1972 near Huitzilac, behavior of the first pair of birds suggested that construction of a nest might be underway. We were unable to make further search that year. On the morning of 7 May 1973, near Huitzilac at the exact site of our 1972 encounter, we found a pair nest-building. The female made several flights of at least 100 m with strands of grass in her beak, terminating each time in the same grove of Mexican oak (*Quercus mexi-*

Table 1

Time (in seconds) and Frequency of Active Nest-building by Chestnut-sided Shrike-vireos Observed in 1973

	Nest 1			Nest 2								
	8 May (09:00–16:00)			11 May (08:30–17:00)*			12 May (09:00–14:30)**			14 May (07:40–14:30)		
	N	mean	range	N	mean	range	N	mean	range	N	mean	range
♂ alone building	2	42.5	(42–43)	2	75	(60–80)	2	90	(60–120)	4	150	(30–270)
♂ alone not building	3	42.5	(25–60)				1	NR***				
♀ alone building	6	120	(30–300)							2	45	(30–60)
♀ alone not building	3	60	(10–110)	1	10		1	NR				
♂, ♀ at nest	3						1					
♂ building	(2)	45 each					(1)	240				
♂ not building	(1)	NR										
♀ building	(3)	105	(60–150)									
♀ not building							(1)	NR				
Totals	17			3			5			6		

* All visits between 09:26 and 09:33.
** All visits between 11:00 and 12:13.
*** NR = not recorded.

canus) and sweet leaf (*Symplocos* sp.). At 09:00 on 8 May 1973, James found a nest (Nest 1) in this grove, in a sweet leaf 10 m tall and 15 cm in diameter at the base. The nest, which was not well concealed, was of typical vireo pensile construction, and was suspended from a subterminal fork of a small branch on the west side of the tree 1.5 m from the trunk and 8 m above the ground.

On 10 May south of Tres Cumbres we began following a pair of foraging birds at 08:00. At 13:00 we had moved from an area 200 m west of old highway 95 to a grove of large pines east of this road when we observed both birds tugging at filamentous lichen in a large pine about 25 m above the ground. The male flew 30 m farther up a slope into a 10 m Mexican oak. The female was briefly lost from sight. Moments later we sighted both birds at work on a nest (Nest 2) which was just beginning to take on a recognizable pensile shape. This nest, on the west side of the tree, was suspended 7 m above the ground from a subterminal

fork about 30 cm from the tip of a lateral branch 2 m in length. The activities of local people near Huitzilac made continuous daily observations of Nest 1 difficult so that our attention was largely focused on Nest 2. Table 1 summarizes observations of active nest-building at Nests 1 and 2.

Both sexes took part in building Nest 1 which, when first seen, was a recognizable bag but was so loosely woven that it could be seen through. Work on the nest involved emplacement of plant or animal material and/or weaving and molding of the structure. The pattern of building activity comprised 2 or 3 bouts from 1 to 3 min apart followed by absences from the nest varying between 16 and 104 min. We visited this nest site briefly thereafter on 12, 15, and 18 May, finding on 12 May that construction had progressed appreciably since the original discovery. On 18 May the nest was essentially complete and the female was beginning to sit in it for increasingly longer periods preparatory to laying. At this time we took the nest because charcoal makers were cutting all trees 10 m from the nest tree and were moving steadily closer.

At the time of its discovery, Nest 2 was in an earlier stage of bag construction than Nest 1. Both adults were active in building on 10 May. On 14 May prior to 11:00 no building occurred although we heard the male singing near the nest tree 7 different times. Heavy rain fell fairly regularly near Tres Cumbres between 10 and 14 May and it was cool and overcast for much of the rest of the time. The slower pace of building at Nest 2 may have been influenced somewhat by these conditions. On 17 May, after heavy rain in the early morning, the area was shrouded in fog and the birds made no visits to the nest between 10:00 and 13:35, although the male sang briefly near the nest tree once. On 18 May it again had rained early in the morning but by the time of our arrival at 12:35 it was sunny and warm. Between 12:35 and 16:00 no building occurred, although the male sang near the nest tree twice and the female was seen once tugging at lichen growing on a nearby pine. On 1 June Nest 2 was examined for us by Sr. M. Ramos O., who reported that the nest was completed, but contained no eggs and that the adults were not in evidence.

At Nest 1, which was in a more advanced stage of construction when found by us, the female did a greater portion of the building. At Nest 2, in an earlier stage when first seen, the contribution of the male exceeded that of the female. Although too small a sample upon which to base definitive conclusions, nonetheless there is an indication, confirmed in other vireonids (Barlow 1962, James 1973) in which both sexes participate in building, that the male predominates early in construction and is gradually replaced by the female as building continues.

FIG. 3. Nest 1—first known nest of *Vireolanius melitophrys* in a sweetleaf (*Symplocos* sp.).

Externally Nest 1 (Fig. 3) measured 100 mm in maximum diameter, 80 mm in minimum diameter, and was 66 mm deep from rim to bottom. Internally the nest measured 70 mm in maximum diameter, 60 mm in minimum diameter, and 50 mm deep. The branches of the fork from which the nest was suspended were 6 and 8 mm in diameter and the fork subtended an angle of 45°. The nest was lined with fine grasses, pine needles, and fibrous plant parts. The bag was largely constructed of filamentous lichen, woven together with spider webbing, and adorned on the exterior with spider egg cases. Except for being larger, the nest closely resembled nests of the 14 species of vireos with which we are familiar. Nest 1 was completed between 8 and 18 May. Judging from our experience with building rates in vireos and extrapolating accordingly, about 20 days were required for total construction. Progress at Nest 2 was slower and as much as 25 days may have been required for its completion. Certainly so large a nest as that built by the Chestnut-sided Shrike-vireo could not be finished very rapidly at the rate of no more than 5 or 6 building

trips per day. By comparison, nests of *Vireo bellii* were completed in 5 days in Kansas (Barlow 1962) and those of the Gray Vireo, *V. vicinior*, in 6 days in Texas (Barlow, pers. observ.).

Nesting material comprising plant fibers, lichen, and animal silk was gathered anywhere within the territories. Occasionally material was obtained in the nest tree but more typically the adults secured items between 20 m and 200 m from the nest site. At 08:00 on 8 May 1973, near Nest 1, we saw a female hanging upside down by one foot while extracting spider webbing with her bill from a bromeliad growing on the underside of a branch of a large oak. On several occasions we saw adults pulling on filamentous lichen and other plant material.

Behavior at the nest and courtship.—Nest-building and courtship activities are intimately intertwined in vireos (Barlow 1962). As mentioned previously, in the Chestnut-sided Shrike-vireo the male travels about the territory with the female, accompanying foraging and building activities with song. Although the female may come to the nest alone, the male is never far away. He usually sings as she arrives and often as she departs. The male usually punctuates his visits to the nest with song or other vocalizations. When members of a pair exchange places at a nest under construction, several contact notes may be uttered. Copulation was observed at Nest 1 on 18 May. At 10:00 the female was seen first in the nest and shortly thereafter on a branch 2 m above it. She gave several emphatic buzz-rattle calls. Then the male flew into the nest tree and the female crouched in a solicitory attitude with her body at right angles to the branch upon which she was perched. He mounted her for 3 sec without attendant physical displays or audible vocalizations. No displays followed copulation. The birds separated, sat quietly near each other for about 15 sec, and then flew off together.

Other aspects of the breeding season.—The initiation of reproductive behavior in the Chestnut-sided Shrike-vireo sometime between late April and early May roughly coincides with the beginning of spring rains. Our observations (5 to 20 May) in Morelos covered part of the period of nest-building. Although the timing of maximum gonadal development was not determined in our study, it doubtless coincides with the terminal stage of nest-building when copulation occurs as is the case in many vireonids (Barlow 1962). The earliest seasonal record available in this species is of a female with a brood patch and shelless egg in her oviduct from 19 km S Morelia (2440 m), Michoacán, taken on 28 April 1961 (Davis 1962). Possibly breeding activities in Michoacán are 2 to 3 weeks in advance of what we observed in Morelos. Miller et al. (1957) listed evidence of breeding in June at several Mexican localities. Rowley (1966)

reported another female with a well-defined brood patch and 3 ruptured follicles from La Cima (1960 m), Oaxaca, secured 16 June 1963. This record suggests a clutch size of 3 in this species. The only other insights available concerning reproductive biology are the capture of a bob-tailed fledgling attended by an adult on 7 July, 6.4 km N San Andres Chicahuaxtla, Oaxaca (Rowley 1966), and another young, a male (MMNH 22582) taken 16 August 1962, 1.3 km W La Jolla, Veracruz. Little else is known of the stages of the breeding cycle already discussed and nothing is known of egg-laying, incubation, or brooding.

Concluding remarks.—The Chestnut-sided Shrike-vireo resembles smaller vireos (Vireoninae) in territorial, courtship, and nesting behavior and in pattern of singing e.g. repetition of a particular syllable or syllables. Foraging strategy is also similar to that of smaller vireonids, reminding us most of that of Solitary Vireos (*V. s. plumbeus*) (pers. observ.). The nest of *Cyclarhis gujanensis* is of typical vireonid pensile construction (Skutch 1967). Thus vireos, greenlets (*Hylophilus*), peppershrikes, and shrike-vireos have the same type of nest, suggesting that these birds are closely related and should be included in the same family. All behavioral and ecological characters taken in concert suggest that the *Vireolanius* spp. are members of the Vireonidae.

SUMMARY

The Chestnut-sided Shrike-vireo, the largest vireonid and one of the few species with dimorphism in plumage color, occurs above 1850 m in the mountains of Mexico from San Luis Potosi south into the volcanic highlands of western Guatemala. We studied this species in northern Morelos in May 1972 and 1973 and in November of 1971 and 1972 in pine-oak forest in the mountains above 2880 m. Shrike-vireos were fairly common at both these sites.

Six vocalizations comprising both songs and calls were recorded in the field and then spectrographically analyzed. These vocalizations included: (1) primary song, a monosyllabic wailing whistle of the male; (2) short song, a non-musical song of the male; (3) *myaaaah*, a call given in an aggressive context; (4) distress calls, resembling those of other passerines; (5) contact calls, single low-pitched buzzy calls given by both sexes; and (6) buzz-rattles, which structurally resemble contact calls, given by both sexes.

Territories were as large as 4.1 ha and were defended against conspecifics by song and occasionally by physical combat.

The Chestnut-sided Shrike-vireo forages at heights between .6 and 30 m in trees and shrubs, taking arthropods from leaves and less frequently from bare branches and trunks. Some seeds and fruits are also eaten.

The first 2 nests known, found in northern Morelos, were quite large but nonetheless of typical, pensile, vireonid construction. Both sexes participated in nest-building, but the female did more of the work in the latter stages of construction. Construction took between 20 and 25 days. The male accompanied the female with song during this building and foraging. Copulation was seen once at Nest 1 at the end of building activities. The breeding season begins in late April, coinciding with the beginning of spring rains, and continues at least into mid-summer.

Behavioral similarities between *Vireolanius* spp. and other vireonids suggest that they are closely related and thus should be included in the Vireonidae.

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NEW LIFE MEMBER

George B. Reynard of Riverton, N.J. has recently become a life member of the Wilson Society. Dr. Reynard is employed as a research scientist at the Campbell Institute for Agricultural Research. While professionally Dr. Reynard is a botanist, his ornithological work in bioacoustics is well recognized. He has prepared record series on the bird songs of Puerto Rico, Jamaica, Hispaniola, and Cuba and has made special studies of the vocalizations of rails, owls, and caprimulgids. In addition to his sound recordings, Dr. Reynard has published papers dealing with this work and has developed a collapsible parabolic sound reflector for use in recording bird songs. Dr. Reynard is married and has 3 children and 2 grandsons.